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Patent  
Docket No.: 1200308WO

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
IPEA/US

In re Application of:

POLYONE CORPORATION, Ashok  
ADUR, Zengli FU, and Roger AVAKIAN

Serial No.: PCT/US2004/023203  
Filed: 19 July 2004 (17.07.2004)

Examiner: Unknown

For: CATALYST SYSTEMS FOR  
ELASTOMER COMPOSITIONS

VIA FAX:  
703-305-3230

**Article 34 Amendment**

Mail Stop PCT, Attn: IPEA/US  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

**Introductory Comments**

In conjunction with the Demand for International Preliminary Examination and in response to the Written Opinion dated November 3, 2004, Applicants amend their claims and submit replacement pages 49-50, marked pages 49-51 to show where amendments were made, and remarks.

With all rejections successfully traversed, Applicants seek a Positive International Preliminary Report on Patentability.

**Remarks**

The International Searching Authority rejected:

- Claims 1-6 and 8-11 using D1;
- Claims 1-4, 6-9, and 11 using D2;

I hereby certify that this paper is being facsimile transmitted to the United States Patent and Trademark Office on the date shown below to IPEA/US Fax Number (703) 305-3230:

2/28/2005  
Date

Signed John H. Hornickel  
John H. Hornickel, Reg. No. 29,393

- Claims 1-9 and 11 using D3;
- Claims 1, 3-5, 8, and 9 using D4;
- Claims 1, 3-5, 8 and 9 using D5; and
- Claims 1-5 and 8-10 using D6.

Applicants have amended their claims into new Claims 1-8. Applicants have incorporated the subject matter of old Claims 2, 5, and 7 into new Claim 1. This amendment obviates the rejections using D1 - D6, because new Claim 1 contains limitations that are combined to overcome each of the D1- D6 references. Importing from old Claim 7 removes D1, D4, D5, and D6. Importing from old Claim 5 removes D2. Importing from old Claim 2, with the elimination in Claim 1 of the nanoclay ingredient removes D3. Therefore, new Claims 1-3 are novel and inventive over D1 - D6.

New Claim 4 and its dependent Claims 5-8 are also novel and inventive over D1 - D6, because new Claim 4 contains the same limitations as new Claim 1, but expressed as a process claim including the text of new Claim 1.

If there are any matters that prevent a Positive International Preliminary Report on Patentability, the Authorized Officer Examiner is invited to contact the Undersigned by telephone.

Respectfully submitted by:

2/28/2005

Date

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What is claimed is:

1. A thermoplastic elastomer prepared using a catalyst system comprising:
  - at least one non-brominated phenolic resin;
  - 5 at least one non-transition metal halide;
  - at least one acid selected from the group consisting of oxalic acid, citric acid, stearic acid, and combinations thereof; and
  - optionally, at least one hydrogen halide scavenger.
- 10 2. The thermoplastic elastomer of claim 1, wherein the at least one phenolic resin comprises methylol groups.
3. The thermoplastic elastomer of claim 1, wherein the halide comprises magnesium chloride, calcium chloride, sodium chloride, potassium  
15 chloride, aluminum chloride, or combinations thereof.
4. A process for making a thermoplastic elastomer, the process comprising:
  - providing a catalyst system;
  - 20 providing at least one thermoplastic polymer or precursors for at least one thermoplastic polymer;
  - providing at least one uncured elastomer;
  - mixing components of the catalyst system, simultaneously or sequentially, with the uncured elastomer; and
  - 25 heating the uncured elastomer in the presence of the catalyst system to form the thermoplastic elastomer composition,
  - wherein the catalyst system comprises at least one non-brominated phenolic resin;
  - at least one non-transition metal halide;

at least one acid selected from the group consisting of oxalic acid, citric acid, stearic acid, and combinations thereof; and  
optionally, at least one hydrogen halide scavenger.

5           5.       The process of claim 4, wherein the amount of the phenolic resin used is about 2 to about 10 percent by weight based on total weight of the uncured elastomer.

10           6.       The process of Claim 4, wherein the amount of the halide used is about 2 to about 8 percent by weight based on total weight of the uncured elastomer.

15           7.       The process of Claim 4, wherein the amount of the acid used is about 1 to about 5 percent by weight based on total weight of the uncured elastomer.

            8.       The process of claim 4, wherein the thermoplastic elastomer composition is prepared using reactive extrusion.

20

What is claimed is:

1. A thermoplastic elastomer prepared using a catalyst system useful in preparing an elastomeric composition, the catalyst system comprising:
  - at least one non-brominated phenolic resin;
  - at least one ingredient selected from the group consisting of a non-transition metal halide and a nanoclay;
  - optionally, at least one acid selected from the group consisting of oxalic acid, citric acid, stearic acid, and combinations thereof; and
  - optionally, at least one hydrogen halide scavenger wherein when the ingredient is nanoclay, the phenolic resin is brominated.
2. The catalyst system of claim 1, wherein the at least one phenolic resin comprises a non-brominated phenolic resin when the ingredient is the non-transition metal halide.
3. The thermoplastic elastomer of claim 1, catalyst system of claim 2, wherein the at least one phenolic resin comprises methylol groups.
4. The catalyst system of claim 1, wherein the catalyst system comprises at least one aliphatic acid, at least one aromatic acid, or combinations thereof.
5. The catalyst system of claim 1, wherein the catalyst system comprises at least one acid, wherein the acid comprises oxalic acid, citric acid, stearic acid, or combinations thereof.
36. The thermoplastic elastomer catalyst system of claim 1, wherein the halide comprises magnesium chloride, calcium chloride, sodium chloride, potassium chloride, aluminum chloride, or combinations thereof.
7. A thermoplastic elastomer preparable using the catalyst system of claim 1.
8. An elastomeric composition comprising:

5       ~~\_\_\_\_\_ at least one elastomer;~~  
         ~~\_\_\_\_\_ optionally, at least one thermoplastic polymer, precursors for at~~  
least one thermoplastic polymer, at least one thermoset, or precursors for at least  
one thermoset polymer;  
         ~~\_\_\_\_\_ reacted in the presence of the catalyst system of claim 1,~~  
         wherein the elastomeric composition comprises a thermoplastic  
elastomer, a thermoset elastomer, or an elastomer.

10       49.     A process for making an **thermoplastic elastomeric**  
composition, the process comprising:  
          **providing a catalyst system of Claim 1;**  
          **providing at least one thermoplastic polymer or precursors for at**  
least one thermoplastic polymer;  
          providing at least one uncured elastomer;  
15       mixing components of the catalyst system, simultaneously or  
sequentially, with the uncured elastomer; and  
          heating the uncured elastomer in the presence of the catalyst system to  
form the **thermoplastic elastomeric composition,**  
          **wherein the catalyst system comprises at least one non-brominated**  
20       **phenolic resin;**  
          **at least one non-transition metal halide;**  
          **at least one acid selected from the group consisting of oxalic acid,**  
citric acid, stearic acid, and combinations thereof; and  
          **optionally, at least one hydrogen halide scavenger.**

25       549.    The process of claim 49, wherein the amount of the phenolic  
resin used is about 2 to about 10 percent by weight based on total weight of the  
uncured elastomer.;

6. The process of Claim 4, wherein the amount of the halide used is about 2 to about 8 percent by weight based on total weight of the uncured elastomer.

5 7. The process of Claim 4, and wherein the amount of the acid used is about 1 to about 5 percent by weight based on total weight of the uncured elastomer.

10 811. The process of claim 49, wherein the thermoplastic elastomeric composition is prepared using reactive extrusion.